

**Laboratory Environment Safety and Health Committee
Cryogenic Safety Subcommittee**

MINUTES OF MEETING 04-09

September 21, 2004

Final

Committee Members Present

W. Glenn
S. Kane
P. Kroon
E. Lessard (Chairperson)
P. Mortazavi
M. Rehak
A. Sidi Yekhlef
R. Travis* (Secretary)

Committee Members Absent

R. Alforque
K. C. Wu

(* non-voting)

Visitors

K. Kusche
C. Vicario
M. Woodle

Agenda:

- 1. Review of the ATF VISA Bolometer**

Minutes of Meeting: Appended on pages 2 through 4.

Signature on File

E. Lessard
LESHC Chairperson

Date

J. Tarpinian
ESH&Q ALD

Date

DM2120.

Chairperson E. Lessard called the ninth meeting in 2004 of the Laboratory Environmental Safety and Health Committee (LESHC) to order on September 21, 2004 at 3:02 p.m.

1. **Review of the ATF VISA Bolometer:** E. Lessard invited C. Vicario, a researcher at the Accelerator Test Facility, to present the VISA II Bolometer to the Committee¹.
 - 1.1. Mr. Vicario and other attendees made the following points during the course of the presentation and in response to specific Committee questions:
 - 1.1.1. The VISA II Bolometer will be used to measure the THz radiation produced by the electron beam that is accelerated in the magnetic chicane of the ATF H-line.
 - 1.1.2. The bolometer is a commercially available unit from Infrared Laboratories with some safety enhancements. These consist of two cryogen reservoir relief valves (RVs), which will be installed on the cryogen ports after filling. An additional RV is placed on the vacuum port to protect the vacuum space. All RVs are set at 0.5 psig.
 - 1.1.3. The radiation will be guided from the linac tunnel to the bolometer, which is located in the hallway adjacent to the ATF Control Room.
 - 1.1.4. The bolometer location has had a Physics Department ESH review and was found acceptable.
 - 1.1.5. The unit is operated at 4.2 °K using liquid helium (LHe) and liquid nitrogen (LN₂). Precooling with LN₂ is required. Bolometer reservoir capacities are 1.2 liters of LHe and 1 liter of LN₂.
 - 1.1.6. With these cryogen capacities, the bolometer has an eight hour operating time. However, since the ATF is basically a day operation, the unit is filled once per day. Fills take about an hour. Sixty fills per year are expected.
 - 1.1.7. A 50 liter LHe dewar and an 80 liter nitrogen dewar will be used for the fills. When they are not in use, they will be stored in the Building 820 highbay or outside the building.
 - 1.1.8. The Committee stated that the dewars should not be stored outside, unless protected from the weather. There was some discussion whether the highbay storage location has been reviewed for ODH. Some attendees thought that this potential concern might have been addressed in the LESHC review of LACARA (LESHC 04-04). Committee Secretary, Rich Travis, committed to review those minutes to determine if this review was performed - **Complete**².
 - 1.1.9. The ODH calculation did not credit ventilation and assumed the simultaneous failure of both bolometer reservoirs and both dewars. The total building volume was assumed, and per the Subject Area complete mixing

¹ Mr. Vicario's presentation, the review material provided to the Committee and these Minutes are posted on the LESHC website:
http://www.rhichome.bnl.gov/AGS/Accel/SND/laboratory_environment_safety_and_health_committee.htm.

² This review was performed during the preparation of these minutes. LACARA has a cryocooler that uses helium gas as the cooling medium. No liquid cryogenics are required. As such, potential ODH issues for the ATF dewars were not reviewed.

was assumed. With these assumptions, the oxygen concentration decreased from 21% to 20.6%.

- 1.1.10. The Committee noted that the total building volume and instantaneous mixing assumptions were acceptable for LHe, but probably aren't valid for a postulated LN₂ release. The Physics Department was requested to perform a LN₂ ODH calculation for the hallway. A smaller dewar or smaller fills for the 80 liter nitrogen dewar can also be used. However, administrative controls would have to be adopted to ensure the calculation assumptions remain valid.
 - 1.1.11. The bolometer manual provides operating instructions. However, these instructions appear to be outdated and the manual does not include current safety practices. For example, air is no longer used to purge dewars (as oxygen may distill out) and acetone is not normally used to check for leaks.
 - 1.1.12. The Physics Department stated that they intend to use NSLS Procedure LS-ESH-0030 (Reference 1) for their operations. The VISA II Bolometer is similar to the NSLS Infrared Laboratories bolometers (same RVs and setpoint, same unit diameter), but may differ in cryogen capacity and overall height. The Physics Department agreed to modify LS-ESH-0030 to make it technically and administratively accurate for their application.
 - 1.1.13. Committee member Payman Mortazavi volunteered to review the modified procedure for technical and administrative accuracy.
- 1.2. The following motion was crafted and unanimously approved by the Committee:
 - 1.2.1. Motion No. 1 - Prior to filling the VISA II Bolometer with cryogenic liquids and subsequent operation, the Physics Department must:
 - 1.2.1.1. Perform a liquid nitrogen oxygen deficiency hazard (ODH) calculation assuming the volume of the hallway. (See 1.1.10, above.) Implement any additional requirements of the ODH subject area as required by the calculated ODH classification.
 - 1.2.1.2. Modify LS-ESH-0030 to make it technically and administratively accurate. Provide the revised procedure for Committee review. (See 1.1.12 and 1.1.13 above.)
 - 1.2.1.3. Ensure all users are trained in Cryogenic Safety and on the new operating procedure. Physics to document this training and provide verification to the LESHC Secretary.
2. The Meeting was adjourned at 4:10 p.m.
 3. Addendum to the Minutes
 - 3.1. As required by 1.1.8 above, a review of the LESHC LACARA meeting minutes was conducted to determine if ODH analyses of the ATF transfer dewars was previously performed. LACARA uses gaseous helium as the cooling medium. No liquid cryogens are required. As such, the LESHC LACARA reviews did not include the ATF Transfer Dewars.
 - 3.2. The LESHC Chairman will generate a memo requesting that the Physics Department perform, document and submit a confirmatory ODH analysis for the

storage location(s) of the ATF transfer dewars. This issue will be tracked in the Institutional ATS.

Reference:

1. NSLS Procedure LS-ESH-0030, "Procedures for Preparing and Operating Infrared Laboratories IR Detectors Using T=4.2K(Non-Pumped Liquid He", Revision A effective 01/12/04, <http://www.nsls.bnl.gov/newsroom/publications/manuals/prm/LS-ESH-0030.htm>

Visa2 Bolometer cryogenics safety review

C. Vicario

Outlines

- Bolometer description
- Custom modifications
- Oxygen Deficiency Hazard (ODH) calculation
- Training qualification, protective equipment
- Operating procedures

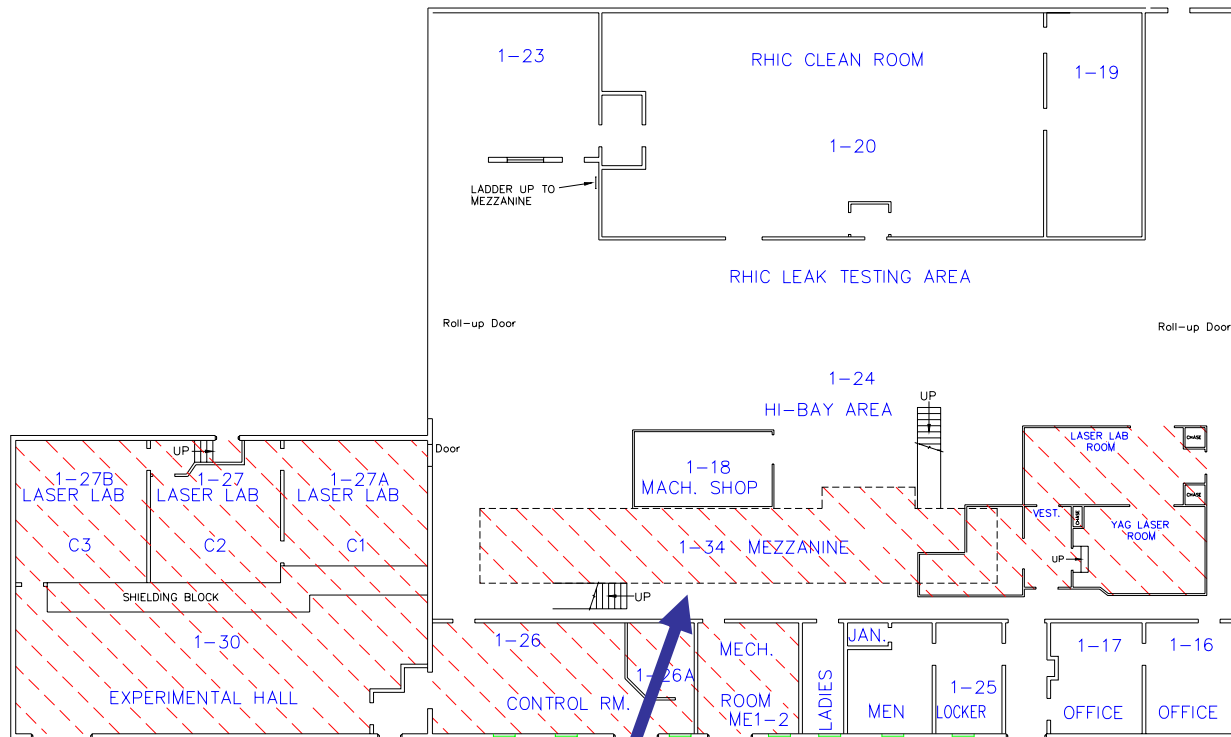
Bolometer cold detector for Visa2 CER experiment

- The detector will be used to measure the THz radiation produced by the e-beam accelerated in the magnetic chicane (ATF linac H-line)
- The radiation will be guided by mirrors, lenses and a metallic pipe to outside of the ATF linac tunnel
- The bolometer will work at 4.2 K with non-pumped LHe

Cryogen liquids

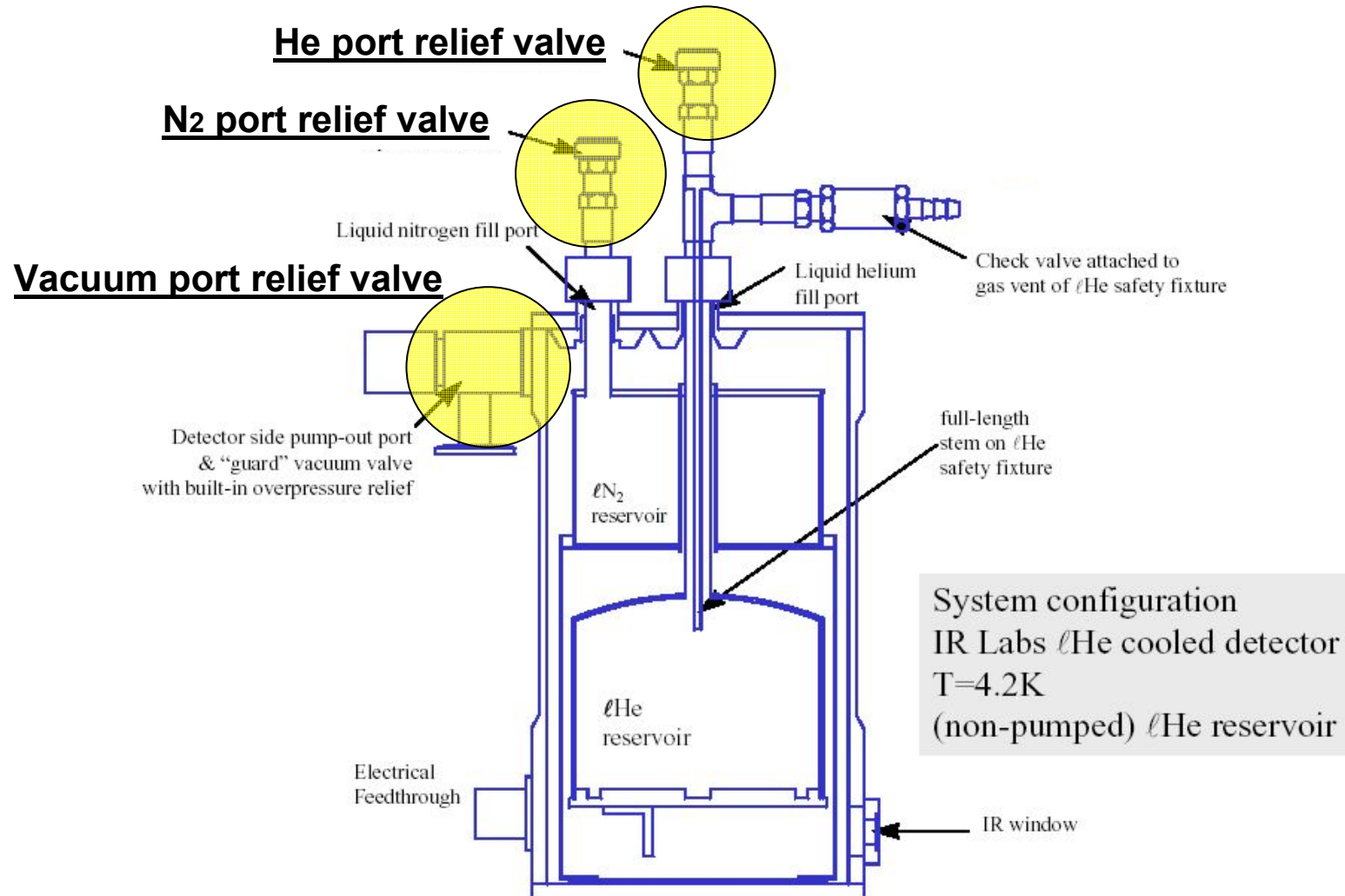
- Liquid N₂ pre-cooling required prior to filling the bolometer with liquid He
- Obtain LN₂ from the ATF portable dewar
- LHe will be provided in a portable dewar upon request via the BNL gas warehouse.

820 highbay plan



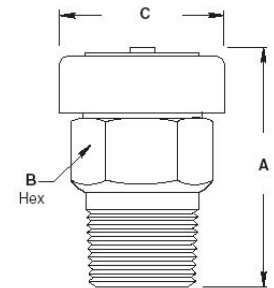
Bolometer location

IR-labs mod. HDL-5 bolometer schematics with the proposed modifications



Bolometer custom modification to increase the safety margin

- Two relief valves will be mounted on the cryogen ports to prevent overpressure in the He and N₂ detector's reservoirs and avoid ice plug.
 - Circle Seal relief valves mod D532T1-2M-.5
 - The cracking pressure is 0.5 psig
 - The valves will be installed after the liquid filling procedure



Vacuum guard port custom modification

- Overpressure relief valve will be placed on the vacuum port.
 - The valve by Oxford Instrument mod. A3-103
 - The cracking pressure is 0.5 psig
- The valve has been welded by BNL on an ISO standard flange to simplify the pump connection



ODH calculation

- Worst case assumptions for the calculation:
 - Not confined space calculation
 - No ventilation system (that is not true) in the building 820 where the detector will be installed
 - All the cryo-liquids in the detector and the portable dewars will be released
 - BNL ODH classification
- Bolometer capacity:
 - N₂ reservoir is 1 liter and He reservoir is 1.2 liters
- Portable dewar capacity:
 - He dewar 50 liters, N₂ dewar 80 liters

ODH calculation 2

- The gas volume equivalent of the cryogenic liquids is 95 m^3 . (I used the gasses expansion constants)
- Building 820 volume rough estimation:
 - Surface between 371.7 to 750 m^2 (I assumed the smallest number)
 - Height 15.2 m
 - Volume 5620 m^3
- **Assuming all gas is released and mixed completely with the atmosphere, the oxygen concentration will fall from 21% to 20.6%. (Oxygen Deficiency Classification $\leq 19.5\%$)**

ODH calculation 3

- Dewars will be parked by the detector just for the refill: 1 hour per day, 60 days per year.
- When the dewars are not used, they will be parked in the highbay or outside the 820 building.

Training, docs, and equipment

- BNL Cryogen Safety training is required for all people working on the experiment.
- Documentation available near the detector:
 - Drawings
 - Manual
 - Operating procedures
- Personal protective equipment required
 - Insulating Gloves
 - Protective face shield

Operating procedure

- The operating procedure is described in the bolometer manual from the manufacturer. Additional safety precautions (such as wearing protective gear and utilizing the relief valves) will be included into the procedure following the recommendations from the BNL internal document LS-ESH-0030: "NSLS procedures for preparing and operating *IR Labs* infrared detectors using $T=4.2$ K (non-pumped He)".

Before using a copy of this form, verify that it is an acceptable version by checking with your Experiment Review Coordinator. Double-click to change the state of a checkbox, or type "X" over the box, or paste this ☒

EXPERIMENT SAFETY REVIEW FORM

REVIEW NUMBER (supplied by ERC):

PRINCIPAL INVESTIGATOR: (local ATF contact Vitaly Yakimenko)

DATE: 8/12/04

GROUP: ATF VISA collaboration

EXT: 7830

E-MAIL: yakimenko@bnl.gov

LIFE NUMBER: 21433

Project Title: VISA-II (amendment to existing ESR PO2004-075 to include study of chicane radiation using cryogenic bolometer)

Location(s): ATF H-line tunnel

Proposed Start Date and Duration: 8/16/04, 6 months

SIGNATURES:

Principal Investigator:	James Rosenzweig	Date: 8/12/2004
Experiment Review Coordinator:		Date:
ESRC Chairman:		Date:
		Date:
		Date:
		Date:
		Date:
Approval Department Chairperson:		Date:
Review/Approval Comments:		
Walkthrough Signature:		Date:
Expiration Date (max 1 yr.):		
FUA Change Required? <input type="checkbox"/> Y <input type="checkbox"/> N	Fire Rescue Run Card Changes Required? <input type="checkbox"/> Y <input type="checkbox"/> N	
Has a NEPA Review been Performed for this Project? <input type="checkbox"/> Y <input type="checkbox"/> N		
Project Termination Acceptance Signature:		Date:
Comments:		

I. DEFINE THE SCOPE OF WORK

A. Description

Describe the experiment purpose/scope. Identify all apparatus that will be used, and associated requirements. List special equipment (X-ray generators, lasers etc.) that will be used during the project. Identify measurement and test equipment, apparatus operating conditions, and required maintenance procedures as appropriate. Include calibration frequency for formal [calibration requirements](#). Attach supporting documents such as engineering calculations, drawings and specifications.

Indicate if modification of facility is required. Include the setup and decommissioning phases of the experiment. The Work Permit Process/Form may better address the hazards & controls of the set-up and/or tear down phases. Indicate if a Work Permit will be used.

VISA-II collaboration plans to study chicane radiation using a cryogenic bolometer. The radiation will be guided by mirrors out of the shielded accelerator tunnel area to the west hallway near the ATF control room, and directed into the bolometer. This form will address the two safety issues: handling the optical and FIR radiation; and handling the cryogenic bolometer.

1. Radiation safety

There are 2 types of the synchrotron radiation generated at the ATF chicane, incoherent synchrotron radiation (SR) and coherent edge radiation (CER). Both beams have an opening angle around 5-10 mrad at the chicane exit port, from which point they are directed into the hallway area by the 5 m long transport line equipped with the set of the FIR picorin collimating lenses.

The incoherent synchrotron radiation (SR) is a broadband and weak. The peak power of SR is a fraction of the Watt, while the average power is a fraction of the picoWatt. Only the long wavelength component of the SR ($\lambda > 10 \mu\text{m}$) will be effectively transported into the hallway, while more energetic photons will be scattered and absorbed in the THz optics.

Coherent edge radiation (CER) is FIR and ranges within 30 - 1000 μm . Pulsed energy in the CER will not exceed 10 μJ level, while the average power is a small fraction of the milliWatt. The average thermal effects of such radiation are insignificant, while the pulsed effects are not known. To avoid any hazardous exposure the following measures are taken:

- the transport line is enclosed into the stainless steel tube and the hallway end of the tube will be blocked by the aluminum shielding until the bolometer installation is complete;
- once the bolometer is installed, the aluminum casing will be build to completely prevent radiation leakage into the hallway out of the integrated transport-bolometer system.

2. Cryogenic safety and bolometer operating procedure

The experiment will operate the IR Labs cryogenic bolometer (model HDL-5, with the customized vacuum port). For the single 24-hours cycle the bolometer requires liquid helium and liquid nitrogen (about 1 liter each). In addition, the cryogenic dewars are surrounded by the vacuum-tight vessel, which is evacuated during the operation to provide the "guard" vacuum around the cryogenic volume.

The "guard" vacuum port was customized by UCLA request to weld a standard ISO flange to simplify the pump-out procedure, and to add the overpressure relief valve. In addition,

a Circle Seal relief valves (model # D5327T1-2M-.5) will be added to the nitrogen and helium fill ports.

The operating procedure is described in the bolometer manual from the manufacturer. Additional safety precautions (such as wearing protective gear and utilizing the relief valves) will be included into the procedure following the recommendations from the BNL internal document LS-ESH-0030: "NSLS procedures for preparing and operating *IR Laboratories* infrared detectors using T=4.2 K (non-pumped He)". Cryogenic fluids handling will be performed by trained personnel only in accordance with the BNL SBMS instruction ESH 5.1.0 "Nonflammable Cryogenic Liquids".

B. Materials Used /Waste Generated

List materials to be used and wastes generated. Refer to the [BNL Chemical Management System](#) for a complete listing of the chemicals in your locations. Include samples, chemicals, controlled substances, gases, cryogenics, radioactive materials, and biological material. You may use generic chemical class descriptions for commonly used materials (e.g., organic solvents, acids). List disposal methods. **Denote disposal method using the codes below.**

Materials Used & Wastes Generated	Disposal Method Type (Code below)	Estimated Quantity (provide units)		Estimated Annual Waste Generation
		Per Use	Total/Yr	
Liquid nitrogen	F, I	1 liter	10 liters	10 liters
Liquid helium	F, I	1 liter	10 liters	10 liters

Note: Identify [Age Sensitive materials or special handling requirements](#).

Disposal Method Codes:

Air Emissions	Liquid Effluents	Wastes
P = Point Source	S = Sanitary	H = Hazardous
F = Fugitive	ST = Storm water	I = Industrial (Non-hazardous waste e.g., oils)
	O = Other	R = Radioactive
		M = Mixed (Radioactive + Hazardous)
		RM = Radioactive Medical
		MW = Medical
		T = Trash

C. Waste Minimization/Pollution Prevention

Describe how you plan to minimize generation of the wastes described above, and identify pollution prevention opportunities. Consider Ordering/using the smallest amount, using recycled material substituting non-hazardous materials. The [Pollution Prevention and Waste Minimization Subject Area](#)

describes how to plan, conduct, and closeout work activities to eliminate or minimize the impact of their activities on the environment.

This experiment is not expected to generate any wastes (other than fugitive nitrogen and helium gases). Whenever new materials are introduced, their potential impact on the waste stream is considered. Materials are used in the minimum required amounts and non-hazardous substitutes are used whenever possible.

II. IDENTIFY AND ANALYZE HAZARDS ASSOCIATED WITH THE WORK

In this section indicate the hazards in each class. Include the setup and decommissioning phases of the experiment.

Physical Hazards (check all that apply)		<input type="checkbox"/> None	
<input checked="" type="checkbox"/> Cryogenics	<input type="checkbox"/> Oxygen deficient atmosphere	<input type="checkbox"/> Noise > 85 dBA	
<input type="checkbox"/> Fall hazards (e.g., ladders, elevated platforms, towers)			
<input type="checkbox"/> Material handling equipment (e.g., cranes, hoists, forklifts)			
<input type="checkbox"/> Machine shop or nonportable powered tools use			
<input type="checkbox"/> Electrical hazards (exposed conductors, large batteries, capacitors, etc)			
<input type="checkbox"/> Confined space		<input type="checkbox"/> Trenching/soil excavation	
<input type="checkbox"/> Extreme temperatures in workplace		<input type="checkbox"/> Remote location	
<input type="checkbox"/> Compressed gases (lecture bottles, cylinders, gas lines)			
<input type="checkbox"/> Pressurized vessels or systems			
<input type="checkbox"/> Vacuum chambers or systems with >1000 J stored energy			
<input type="checkbox"/> Autoclaves or high temperature ovens			
<input type="checkbox"/> Open flames		<input type="checkbox"/> Welding, brazing, silver soldering	
<input type="checkbox"/> Flammable gases/liquids/solids		<input type="checkbox"/> Other spark producing activity	
<input type="checkbox"/> Other (specify):			
Chemical Hazards (check all that apply)		<input checked="" type="checkbox"/> None	
<input type="checkbox"/> Carcinogens	<input type="checkbox"/> Highly acute toxins	<input type="checkbox"/> Reproductive toxins	<input type="checkbox"/> Corrosives
<input type="checkbox"/> Flammable liquids	<input type="checkbox"/> Flammable solids	<input type="checkbox"/> Strong oxidizers	<input type="checkbox"/> Oils
<input type="checkbox"/> Explosives	<input type="checkbox"/> Peroxidizables	<input type="checkbox"/> Pyrophoric materials	<input type="checkbox"/> PCBs
<input type="checkbox"/> Asbestos	<input type="checkbox"/> Pesticides/herbicides	<input type="checkbox"/> Controlled substances	
<input type="checkbox"/> Highly reactive materials		<input type="checkbox"/> Perchlorates	
<input type="checkbox"/> Storage or use of Beryllium or Beryllium articles. Attach Beryllium Use Review Form if checked.			
<input type="checkbox"/> Toxic metals (e.g., As, Ba, Be, Cd, Cr, Hg, Pb, Se, Ag)			
<input type="checkbox"/> Other (specify):			

Radiation Hazards (check all that apply)		<input type="checkbox"/> None
<input type="checkbox"/> Sealed radioactive sources	<input type="checkbox"/> Windowless radioactive sources	
<input type="checkbox"/> Dispersible radioactive materials	<input type="checkbox"/> Neutron-emitting radioactive sources	
<input type="checkbox"/> Non-fissionable radioactive materials	<input type="checkbox"/> Fissionable radionuclides	
<input type="checkbox"/> Ionizing radiation-generating devices (x-ray sources, accelerators)		
<input type="checkbox"/> Class II, IIIa, or IIIb (visible <15mW) lasers	<input type="checkbox"/> Class IIIb (nonvisible >15mW) or IV lasers	
<input type="checkbox"/> Dynamic magnetic fields >1G at 60 Hz or dynamic electric fields > 1kV/m at 60 Hz		
<input type="checkbox"/> Static magnetic fields < 5 G. No Exposure Form is required		
<input type="checkbox"/> Static magnetic fields > 5 G and < 600 G	<input type="checkbox"/> Static magnetic fields exposure. Attach Static Magnetic Fields Exposure Form when required.	
<input type="checkbox"/> Static magnetic fields ≥ 600 G		
<input type="checkbox"/> Radio frequency (RF) or Microwave sources exceeding 10 mW radiated output		
<input type="checkbox"/> Infrared sources > 10 W	<input type="checkbox"/> Ultraviolet sources > 1 W	
<input type="checkbox"/> Extremely low frequency (ELF) radio sources		
<input checked="" type="checkbox"/> Other (specify): SR (broadband), CER (far infrared)		
Biological Hazards (check all that apply)		<input checked="" type="checkbox"/> None
<input type="checkbox"/> Regulated etiological agent	<input type="checkbox"/> Recombinant DNA	<input type="checkbox"/> Animals
<input type="checkbox"/> Human blood/components, human tissue/body fluids		<input type="checkbox"/> Human subjects
<input type="checkbox"/> Other (specify):		
Offsite Work (check appropriate box)		<input checked="" type="checkbox"/> None
<input type="checkbox"/> Reviewed or controlled by ES&H programs at the offsite location	<input type="checkbox"/> Requires additional controls (include in the next section)	
<u>Security Issues Checklist</u> (check all that apply)		<input checked="" type="checkbox"/> None
<input type="checkbox"/> Access controls	<input type="checkbox"/> Cyber security	
<input type="checkbox"/> Classified materials or information	<input type="checkbox"/> Counter-intelligence work	
<input type="checkbox"/> Import or export controls	<input type="checkbox"/> Personnel security	
<input type="checkbox"/> Nuclear material control and accountability	<input type="checkbox"/> Valuable materials	
<input type="checkbox"/> Other (specify):		

See [Identification of Significant Environmental Aspects and Impacts Subject Area](#) or your ECR if you need assistance completing the following table.

Significant Environmental Aspects (check all that apply)	<input checked="" type="checkbox"/> None
<input type="checkbox"/> Any amount of hazardous waste generation	

<input type="checkbox"/> Any amount of radioactive waste generation
<input type="checkbox"/> Any amount of mixed waste generation (radioactive hazardous waste)
<input type="checkbox"/> Any amount of transuranic waste generation
<input type="checkbox"/> Any amount of industrial waste generation (e.g., oils, vacuum pump oil)
<input type="checkbox"/> Any amount of Regulated Medical Waste
<input type="checkbox"/> Any atmospheric discharges that require engineering controls to reduce hazardous air pollutants or radioactive emissions, or are identified as a Title V emission unit, or require monitoring under NESHAP
<input type="checkbox"/> Any liquid discharges that require engineering controls to limit the quantity or concentration of the pollutant, or include radionuclides detectable at the point of discharge from the facility, or contain any of the chemicals listed on BNL's SPDES permit
<input type="checkbox"/> Storage or use of any chemicals or radioactive materials that require engineering controls – see Storage and Transfer of Hazardous and Nonhazardous Materials Subject Area
<input type="checkbox"/> On-site or off-site transportation of chemicals or dispersible radioactive materials
<input type="checkbox"/> Any use of once-through cooling water with a flow of 4 gpm – 24 hrs/day (10 gpm – 8 hrs/day, daily use of >15 gpm for >60 days) and discharging to the sanitary sewer
<input type="checkbox"/> Soil contamination or activation
<input type="checkbox"/> Any underground pipes/ductwork that contains chemical or radioactive material/contamination
<input type="checkbox"/> Other environmental aspects related to your work (specify):
<input type="checkbox"/> Process Assessment Form required (determined by ECR or other qualified person)

III. DEVELOP AND IMPLEMENT HAZARD CONTROLS

For each hazard identified in the previous section, describe how that hazard is controlled. Identify the **Engineering Controls** (e.g., interlocks, shielding), **Administrative Controls** (e.g., procedures, RWP's) or **Personal Protective Equipment** (e.g., respirators, gloves; see the [Personal Protective Equipment Subject Area](#)) that will be employed to reduce hazards to acceptable levels.

The Experiment Review Coordinator, along with the **Principal Investigator (PI)** and Building Manager, as appropriate, will evaluate this experiment for impacts that will require an update to the Facility Use Agreement (FUA), and or Fire/Rescue Run Cards.

The **PI** develops and implements hazard controls in consultation with, and using feedback from, the personnel who will be performing the work.

A. Physical Hazards/Controls

Hazard	Controls (Administrative, Engineered, Protective Equipment)
Liquid nitrogen and liquid helium	Knowing hazards and complying with safe operating procedures including required protective equipment (gloves and goggles). Filling operations and dewars storage locations are in the high bay area or in the west hallway. Both locations have very large reservoirs of oxygen and good ventilations.

Note: Include maintenance, inspection and testing, and formal calibration, including frequency as appropriate.

B. Chemical Hazards/Controls

Hazard	Controls (Administrative, Engineered, Protective Equipment)
NONE	

Note: Refer to the [Working with Chemicals Subject Area](#) for requirements regarding particularly hazardous chemicals such as carcinogens, reproductive toxins, and highly acute toxins, including postings, decontamination plan, and address above.

C. Environmental Hazards/Controls

Hazard	Controls (Administrative, Engineered, Protective Equipment)
NONE	

Note: Identify the requirements from applicable waste management subject area ([hazardous](#), [radioactive](#), [mixed](#), [regulated medical](#)). List all applicable environmental permits (Suffolk County Art. XII, Title V Emission Source, etc.) and the relevant controls required by those permits.

D. Radiation Hazards/Controls

Hazard	Controls (Administrative, Engineered, Protective Equipment)
CER (far IR)	The radiation transport output is shielded at all times except during the bolometer installation (when the machine is turned off).

Note: List sources/materials. Attach or refer to Radiation Work Permits.

E. Biological Hazards/Controls

Hazard	Controls (Administrative, Engineered, Protective Equipment)
NONE	

Note: List additional approvals/permits/reviews required (e.g., BNL Biosafety Committee approval).

F. Offsite Work Hazards/Controls

Hazard	Controls (Administrative, Engineered, Protective Equipment)
NONE	

Note: List the location of all off-site work and identify any off-site organization whose ESH requirements will be followed (e.g., other DOE Labs). Indicate additional controls (not specified above) that are needed.

G. Security Issues/Controls

Issue	Controls (Administrative, Engineered, Protective Equipment)
NONE	

Note: See the [Security Checklist](#), and, if necessary, consult the security office at 4691 or 4496 for more information or guidance.

IV. PERFORM WORK WITHIN CONTROLS

All work shall be performed within the controls identified within this document. It is the PI's responsibility to ensure that this document is kept up to date. The PI should consult with the ERC as appropriate to determine if changes to this document are significant enough to require a new review/document.

If a hazard assessment may be required for this experiment, the PI should contact the ES&H Coordinator and/or the ERC for assistance. The PI should document any hazard assessments performed for this experiment in Section VI.

A. Training

List all project personnel, indicating they are authorized and competent to perform the work described. List the training required for each individual. Identify any certifications or experiment-specific training required. Indicate if any project personnel are minors (under 18 yrs. of age). Contact your Training Coordinator and ES&H Coordinator as appropriate for assistance.

It is the responsibility of the PI to maintain a complete up-to-date list of personnel and their full training requirements, and to ensure that training and qualifications are maintained. A [sample ESR signature form](#) is available.

Name	Life/Guest #	Required Training (Course or JTA code)
Carlo Vicario	X9540	PO-04 ATF User, Cryogen Safety
Gerard Andonian	X8690	PO-04 ATF User, Cryogen Safety
Alex Murokh	M7557	PO-04 ATF User, Cryogen Safety
Vitaly Yakimenko	21433	PO-04 ATF User, Cryogen Safety

Note: The [BNL Training and Qualifications Web Site](#) contains course offerings and descriptions, required training checklist, as well as employee training records.

B. OSHA/DOE Required Medical Surveillance

Indicate if potential exposure is in excess of trigger levels listed. Exposure evaluation and/or medical surveillance may be required. Additional [training](#) may be required for any indicated agent. See the [SBMS](#) for additional information and controls on the hazards listed.

Regulated Hazard	Hazard Specific Training Trigger	Medical Surveillance Exposure Trigger
<input checked="" type="checkbox"/> None		
<input type="checkbox"/> Inorganic Arsenic	Any day above the OSHA action level (without regard to respirator use)	30 days/year above the action level (without regard to respirator use)
<input type="checkbox"/> Biohazards (CDC/NIH/WHO listed Agent)	None	See Subject Area for guidance
<input type="checkbox"/> Cadmium	Any day above the OSHA action level	30 or more days/year at or above the action level
<input type="checkbox"/> Lasers	Use Class IIIb or Class IV Lasers	Use Class IIIb or Class IV Lasers
<input type="checkbox"/> Lead	Any day above the OSHA action level	30 or more days/year at or above the action level
<input type="checkbox"/> Methylene Chloride	Any day above the OSHA action level	<ul style="list-style-type: none"> - 30 days/year at or above the action level - 10 days/year above the 8-hour TWA PEL or the STEL - Any time above the 8-hour TWA PEL or STEL for any period of time where an employee at risk from cardiac disease or other serious

Regulated Hazard	Hazard Specific Training Trigger	Medical Surveillance Exposure Trigger
		MC-related health condition and employee requests inclusion in the program
<input type="checkbox"/> Noise	Any day above the ACGIH TLV	Any time equal or greater then 85 dBA TWA 8-hour dose
<input type="checkbox"/> OSHA Regulated Chemicals <i>Acrylonitrile Benzene</i> <i>Benzidine 1,3 Butadiene</i> <i>4-Dimethyl aminoazobenzene</i> <i>Ethylene oxide Ethyleneimine</i> <i>Formaldehyde Vinyl Chloride</i>	Any day above the OSHA PEL	<ul style="list-style-type: none"> - Routinely above the action level (or in the absence of an action level, the PEL) - Event such as a spill, leak or explosion results in the likelihood of a hazardous exposure
<input type="checkbox"/> Static Magnetic Fields	Worker who routinely works in magnetic field	<ul style="list-style-type: none"> - Any time at ≥ 0.5 mT (5 G) for Medical Electronic Device wearer - Any day at ≥ 60 mT (600 G) to whole body [8 hour average] - Any day at ≥ 600 mT (6000 G) to limbs [8 hour average] - Any Time at ≥ 2 T (20,000 G) to whole body [ceiling] - Any time at ≥ 5 T (50,000 G) to limbs [ceiling]

C. Emergency Procedures

Identify any emergency actions, procedures, or equipment that must be in place to insure personnel safety and environmental protection. Include the location of emergency shutoffs, and spill control materials.

Existing ATF linac operating procedures will be followed. Linac emergency stop buttons as well as other equipment and procedures described in the existing ATF Building 820 Local Emergency Plan are adequate.

For cryogenic burns: in severe cases summon medical attention (call x2222) immediately. Flush affected areas of the skin w/copious quantities of tepid water. Loosen any clothing that may restrict circulation of blood. Protect the burned areas from infection or further injuries.

D. Transportation

Identify materials, hazards and controls for any on-site and off-site transportation of hazardous and/or radioactive materials. See relevant SBMS Subject Areas.

There will be no transport of materials around the lab. Cryogenic storage dewars will be moved inside the West Hall and High Bay areas slowly and with care according to the operating procedure.

E. Notifications

The PI or designee should notify building occupants of any activities that might impact them or their work, and document this here. List external personnel/organizations that require notification related to experimental activities and/or to be notified of changes (e.g., a BNL Committee for review/approval, Occupational Medicine Clinic, Fire/Rescue).

The notification sign will be placed in the West Hall operation area to warn of cryogenic hazards in addition to the warning not to touch, dismantle or move FIR radiation enclosure without proper authorization.

F. Termination/Decontamination

Describe any decommissioning plan, including decontamination of the area at termination of the experiment. Identify any hazards and controls, special precautions or procedures. Include chemical and

waste reconciliation. Indicate if a walk-down or an ERE will be scheduled to ensure the area is suitable for future projects. Indicate if Work Permit Form/Procedure will be used.

At completion of the project, all components exposed to e-beam will be properly identified and checked for activation. Cryogenic-related equipment will be returned to ATF.

G. Community Involvement Issues

Identify issues that may require community involvement (see the [Community Involvement in Laboratory Decision-making Subject Area](#)) and describe the plan that addresses these issues. Attach the Community Involvement Checklist.

NONE

V. PROVIDE FEEDBACK ON ADEQUACY OF CONTROLS AND CONTINUE TO IMPROVE SAFETY MANAGEMENT

Provide comments on the review process, including this form and communication. Identify any lessons learned or worker feedback contributing to modifications/improvements to the controls or process.

NONE

VI. ATTACHMENTS

Use this section to include any supporting documents, hazard assessments, figures, tables, etc. that were not entered into the previous sections of the form.

Attachment #1 (available upon request) – Bolometer manual (model HDL-5, customized for UCLA, manufactured by Infrared Laboratories).

Attachment #2:

<http://www.nsls.bnl.gov/newsroom/publications/manuals/prm/LS-ESH-0030.htm>

BNL internal document LS-ESH-0030: "NSLS procedures for preparing and operating *IR Laboratories* infrared detectors using T=4.2 K (non-pumped He)"

Attachment #3:

<https://sbms.bnl.gov/ld/ld08/ld08d521.htm>

ESH 5.1.0 Nonflammable Cryogenic Liquids, Rev. 2



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Managed by Brookhaven Science Associates
for the U.S. Department of Energy

Date: *October 5, 2004*

To: *M. Zarcone*

From: *E. Lessard, Chair, BNL Environment, Safety and Health Committee*

Subject: *LESHC 04-09, Review of the ATF VISA Bolometer – Request for ATF Transfer Dewar ODH Analysis*

The BNL ES&H Committee reviewed the Accelerator Test Facility VISA Bolometer in our meeting of September 21, 2004. During the course of our review, there was uncertainty whether the ATF Transfer Dewars have been analyzed for Oxygen Deficiency Hazards. Some attendees thought that this concern might have been addressed during our earlier reviews of the LACARA Experiment.

Subsequent to the meeting, the LESHC determined that our previous reviews did not address this potential concern. The Physics Department is requested to review the SBMS Oxygen Deficiency Hazards Subject Area and perform calculations for the oxygen deficiency risk associated with the ATF Transfer Dewar. Please institute resulting control measures, if any, and submit the calculations to the LESHC Cryogenic Subcommittee.

Kindly provide a response at your earliest convenience for Committee review.

Copy to:

LESHC Members
S. Aronson
M. Beckman
J. Ellerkamp
T. Kirk
K. Kusche
J. Tarpinian
V. Yakimenko
M. Zarcone